Innovative Techniques to Establish Native Plants

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Sites: Yakima Training Center
Fort Carson
Fort Drum

Thanks to: Pete Nissen, Clarke Reames,

Environmental Quality Technology Requirements

Rank	Title
3	Erosion Control
5	Mitigating Army Unique Impacts
6	Land Rehabilitation

Need for Research

- **Native plants: federal directive**
- **Mission requirements**
- **Adaptability to other habitats (threatened & endangered species)**

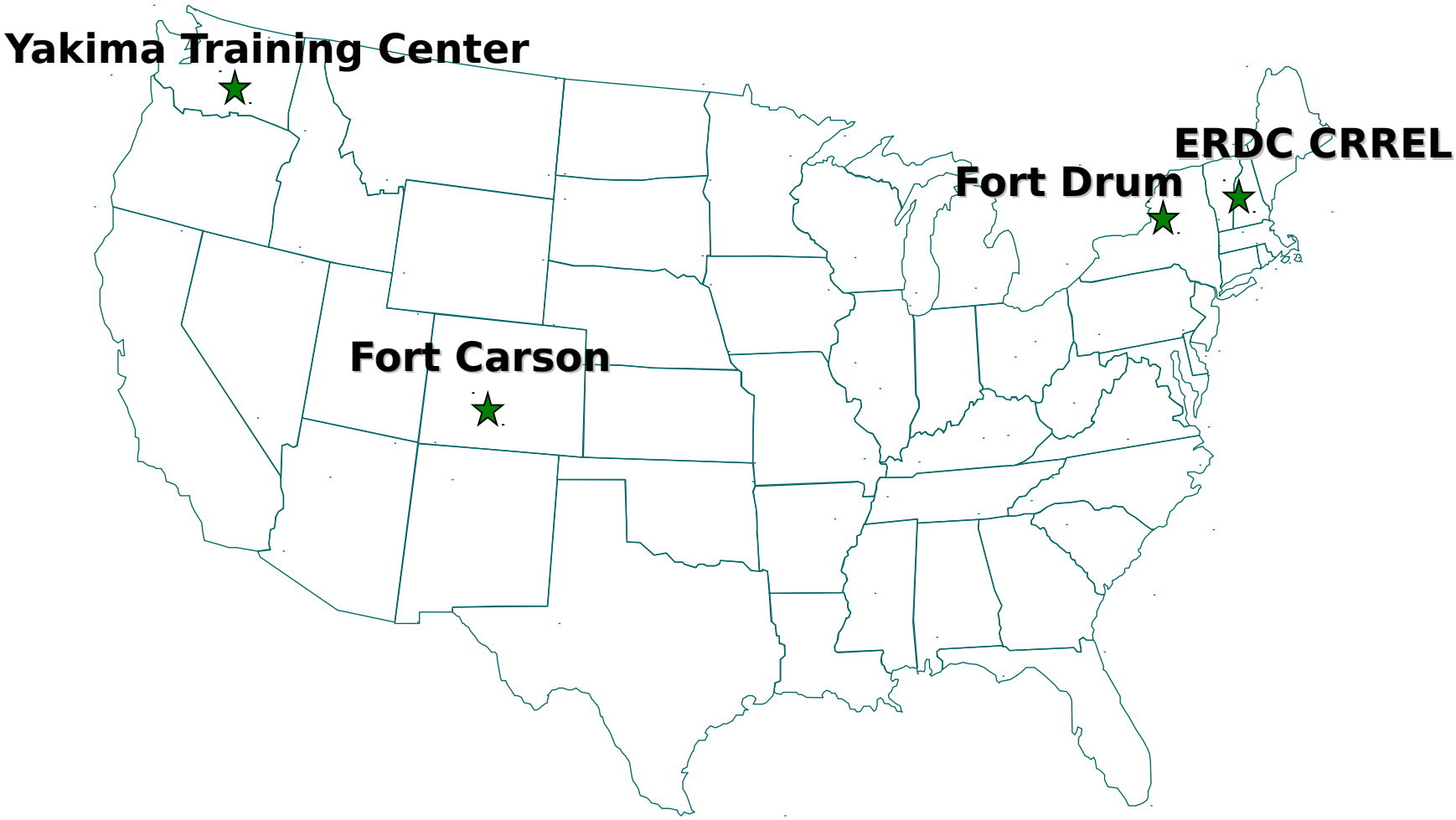
Problems with Native Plant Establishment

- **Annual invasive plants have a seasonal, short-term rapid growth period**
- **Natives establish slowly**
- **Poor soils**
- **C_3 versus C_4 plants**

Techniques to Overcome Slow Establishment Rate of Natives

- **Use of short-term naturalized or introduced species (Ft. Drum)**
- **Soil amendments to promote establishment (Ft. Drum)**
- **Seeding depth and width (Carson and YTC)**
- **Plant Breeding (Carson and YTC)**

Research Sites



Results

Humid

(Fort Drum, New York)

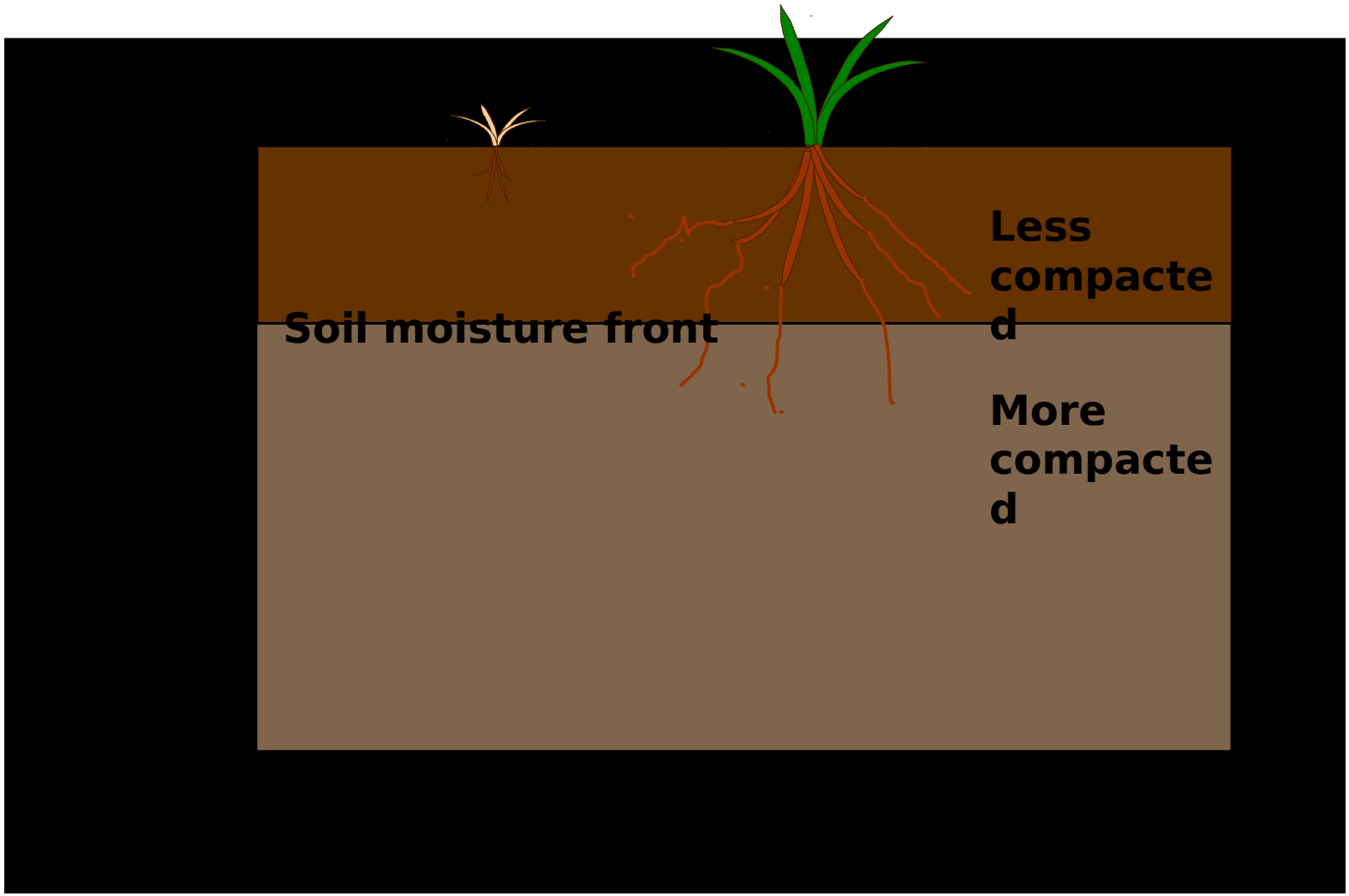
Site Assessment

- **Soil: sandy**
- **Climate: cool, moist**
- **Establishment problems: moisture & nutrient deficient**

First Step: Site Assessment

- **Consider future land use**
- **Survey vegetation**
- **Analyze soil**

Soil Compaction and Root Growth

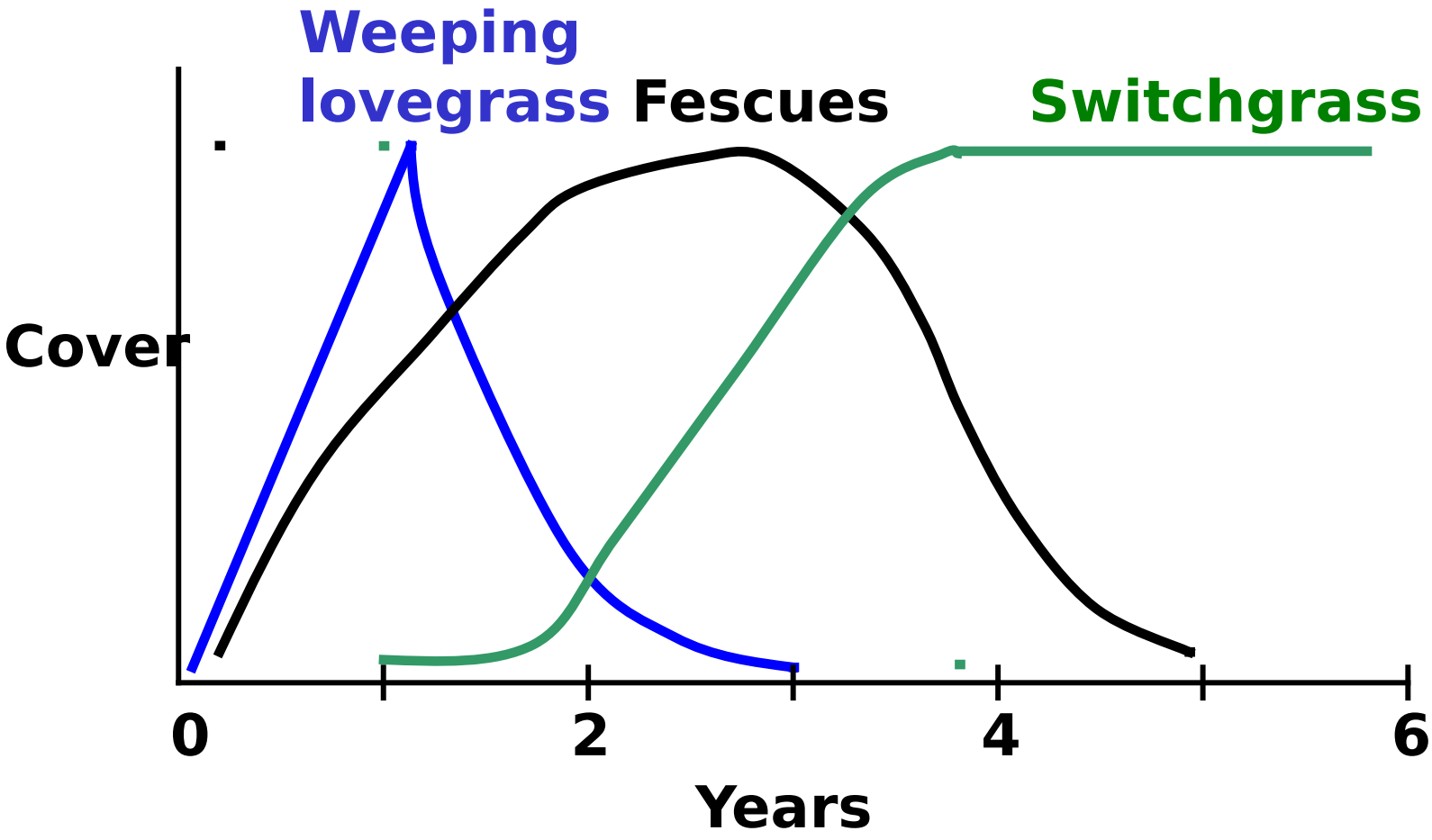


Plant Cover: Fine Fescue

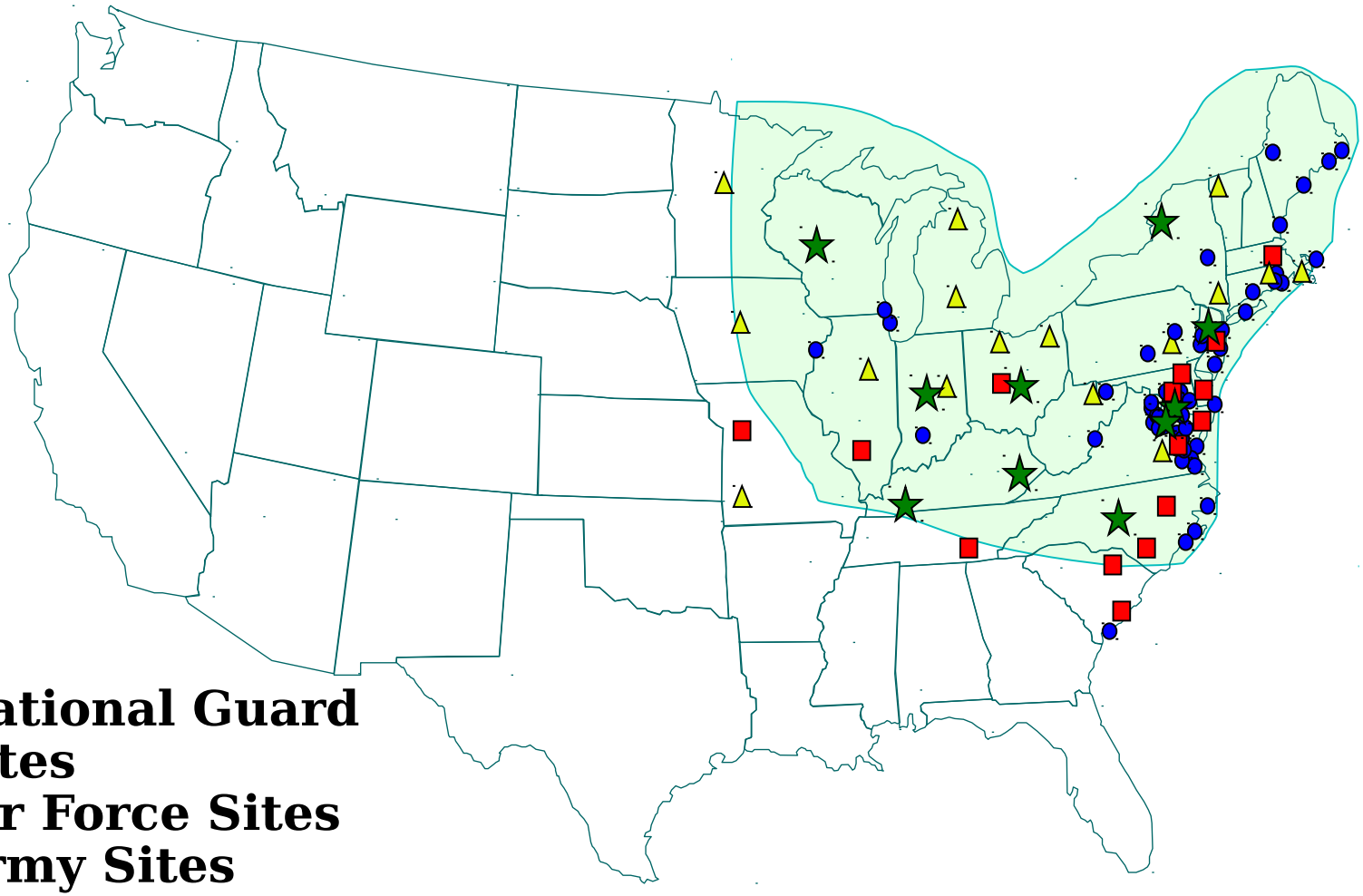
Plant Cover: Switchgrass

Before & After

Recommended Seed Mixture



Potential Area of Use



Results

Dry

(Fort Carson and Yakima Training Center)

Site Assessment

Comparing Military Mix Alone vs. Mix with Naturalized Species

Species composition after mixed seeding

Grass Seed Mix	Naturalized	Native	Weeds
	% of plant biomass (dry matter)		
Standard Military Mix	5	31	64
Mix + Tetraploid RWR	5	58	31
Mix + Bozoisky RWR	13	64	18
Mix + RoadCrest CWG	65	23	12
Mix + CD-II CWG	85	9	8
Mix + Vavilov SWG	87	9	6
LSD (0.05)	7	9	7

Site Assessment

- **Soils:**
  fine textured
- **Climate:**
  cool, dry
- **Species studied:**
  natives
  naturalized

Cheatgrass in Plots of Single Species

Grasses	Mean (% Cheatgrass)
Goldar Bluebunch Wheatgrass (native)	59
Secar Snake River Wheatgrass (native)	57
Vavilov Siberian Wheatgrass (naturalized)	19

Cheatgrass in Plots of a Single Species (Two Row Spacings)

	Row Spacing (cm)	
Grasses	25	35
	(%)	Mean
Goldar Bluebunch Wheatgrass	53	65
Secar Snake River Wheatgrass	35	78
Vavilov Siberian Wheatgrass	7	30

Cheatgrass Mixes Planted Together

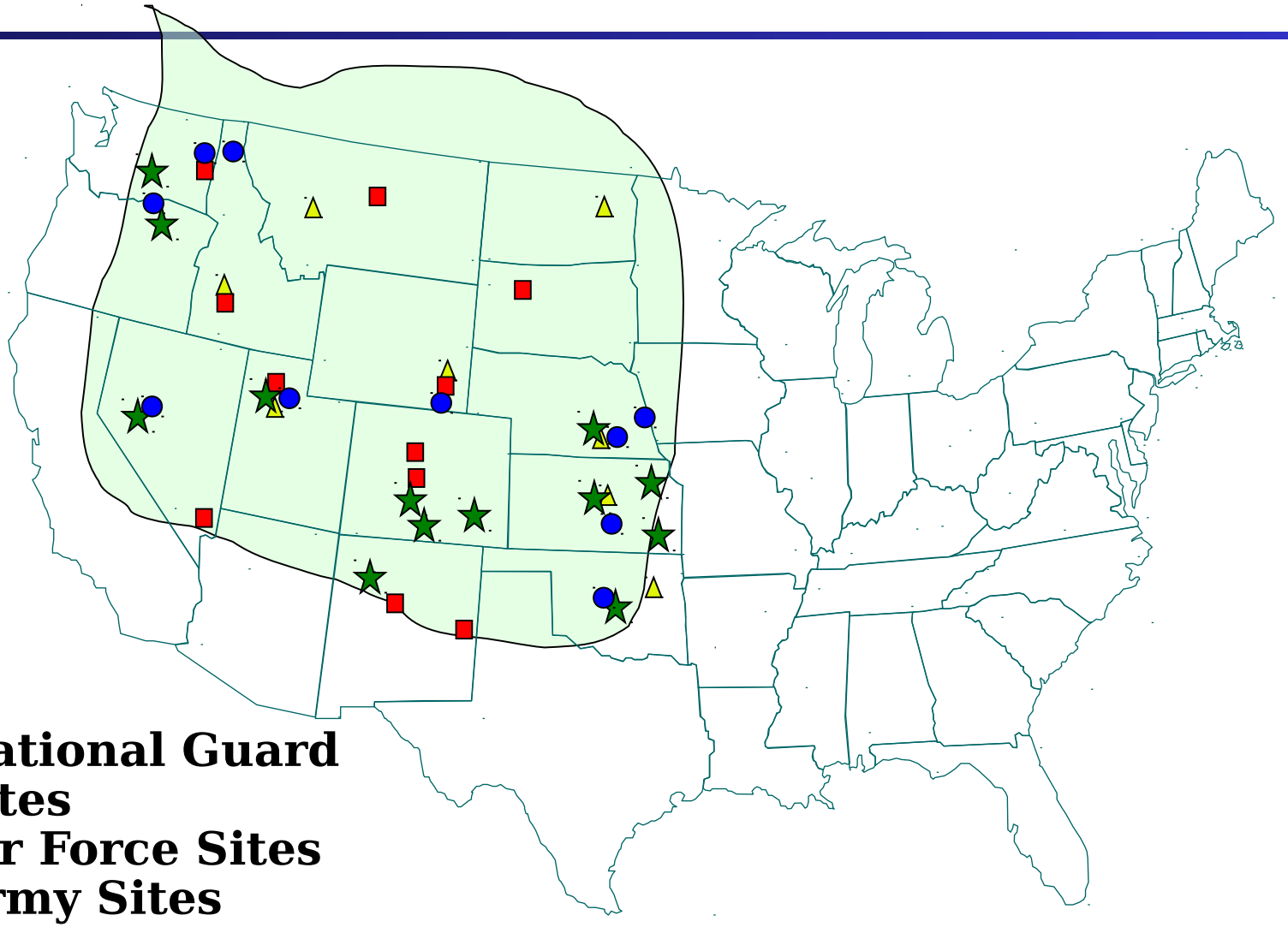
Mix	Mean (% Cheatgrass)
Bluebunch/Snake River Mix	64
Bluebunch /Vavilov Mix	37
Snake River/Vavilov Mix	35
Bluebunch/Snake River/Vavilov Mix	33
$LSD_{0.05}$	15

Vavilov Alone

Bluebunch and Snake River Wheatgrass Mixed

Alternating Rows of Vavilov Siberian Wheatgrass and Snake River Wheatgrass

Potential Area of Use



Conclusions:

- **Short-term naturalized species and soil amendments to promote native establishment**

- **Alternative seeding methods and decreased row spacing decreased cheatgrass establishment**